

**OLIVINE AND PYROXENE COMPOSITIONS IN LL6 CHONDRITES FROM ANTARCTICA.** Arch Reid Department of Geosciences, University of Houston, Houston Texas 77204-5503 (areid@uh.edu)

Several detailed studies have been made of LL chondrites based primarily on non-Antarctic samples (e.g 1-7). Mineral compositional data were obtained from 13 LL6 chondrites from the Antarctic collection as part of a more comprehensive survey of the major mineral compositions in Antarctic LL chondrites. The data will be used to study mineralogical differences within the LL group and to test for progressive compositional changes in the sequence LL4 to LL5 to LL6.

Analyses were made by electron microprobe for one thin section from each of 13 LL6 chondrites. All analyses used the same mineral standards and were completed under identical conditions. A homogeneous LL chondrite was analyzed at separate sessions as a check on reproducibility of the data.

Table 1 provides an estimate of the measured variability in mineral composition within a single LL6 chondrite, EET92013,4: numbers in italics are one standard deviation. Table 2 compares averaged olivine and orthopyroxene data for EET92013,4 for analyses run on 4 separate days.

Table 1: Microprobe analyses of major silicate minerals in EET92013,4

	SiO <sub>2</sub>	TiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Cr <sub>2</sub> O <sub>3</sub>	FeO	MnO	MgO	CaO	Na <sub>2</sub> O	K <sub>2</sub> O
olivine (65)	36.90	.01	.01	.04	27.44	.50	34.26	.02	.00	.00
<i>std dev</i>	.20	.01	.02	.18	.21	.02	.22	.01	.00	.00
orthopyroxene (17)	54.27	.19	.16	.12	16.41	.49	26.74	.89	.01	.00
<i>std dev</i>	.32	.01	.01	.03	.27	.01	.16	.13	.00	.00
clinopyroxene (5)	53.40	.44	.51	.82	6.34	.20	15.80	21.60	.53	.00
<i>std dev</i>	.38	.01	.01	.01	.17	.01	.13	.17	.00	.00

Table 2: Olivine and orthopyroxene data for EET92013,4: analyses run on separate days

	SiO <sub>2</sub>	TiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Cr <sub>2</sub> O <sub>3</sub>	FeO	MnO	MgO	CaO	Na <sub>2</sub> O	K <sub>2</sub> O
olivine (65)	36.90	.01	.01	.04	27.44	.50	34.26	.02	.00	.00
olivine (22)	37.08	.01	.04	.03	27.50	.47	34.44	.03	.00	.00
olivine (26)	37.19	.01	.01	.01	27.46	.49	35.10	.01	.00	.00
olivine (37)	36.60	.01	.01	.01	27.75	.45	34.85	.01	.00	.00
orthopyroxene (17)	54.27	.19	.16	.12	16.41	.49	26.74	.89	.01	.00
orthopyroxene (9)	54.39	.19	.18	.10	16.38	.47	26.89	.88	.01	.00
orthopyroxene (9)	54.63	.19	.17	.10	16.23	.48	27.26	.88	.02	.00
orthopyroxene (8)	54.34	.18	.18	.10	16.56	.45	27.03	.84	.01	.00

Olivines in individual LL6 chondrites show little compositional variation. Within the small group of LL6 chondrites analyzed the total range in average olivine is Fo<sub>71.6</sub> to Fo<sub>68.8</sub>. Orthopyroxene is also homogeneous with a slightly wider range of compositions from En<sub>75.2</sub> to En<sub>71.8</sub>. Calcium content shows a relatively larger spread, from Wo<sub>1.1</sub> to Wo<sub>3.0</sub>. There is no well defined trend relating Ca content of orthopyroxene to iron content in coexisting olivine but the higher Wo values in orthopyroxene occur in the more iron-rich samples. Coexisting clinopyroxenes are in the range Wo<sub>40</sub> to Wo<sub>44</sub>. Figure 1 shows the a plot of Fa in olivine versus Fs in orthopyroxene. These samples show a range of iron values with no preferred compositions. Several of the meteorites in figure 1 plot as closely matched pairs. Of the 5 closest pairs, three sets come from the same collection area and two pairs were collected in the same year. Additional data may resolve whether the pairing shown in figure 1 is coincidental or whether these are indeed paired falls.

Summary compositions of olivine, orthopyroxene, clinopyroxene and spinel in the LL6 chondrites analyzed to date are presented in Table 3.

Table 3: Averaged mineral compositions for 13 LL6 Antarctic chondrites

	SiO <sub>2</sub>	TiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Cr <sub>2</sub> O <sub>3</sub>	FeO	MnO	MgO	CaO	Na <sub>2</sub> O	K <sub>2</sub> O	Total
olivine	37.14			.03	26.82	.47	35.03	.04			99.60
orthopyroxene	54.53	.19	.20	.14	16.06	.46	26.97	.96	.02		99.54
clinopyroxene	53.24	.41	.65	.84	6.22	.21	16.10	21.36	.53	.01	99.60
spinel	.03	3.31	5.66	55.48	32.24	.13	1.67	.02			98.55

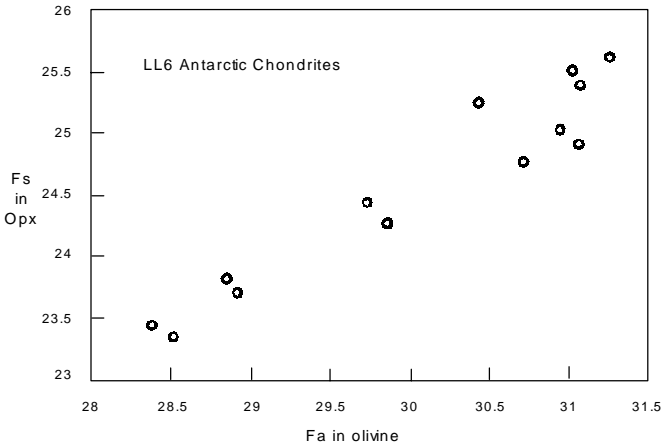


Figure 1: Fa contents of olivine versus Fs contents of orthopyroxene: average values for 13 LL6 Antarctic chondrites

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